

hail storm from southwest to northeast. Hail-stones measuring half an inch in diameter fell, doing considerable injury to fruit and vegetables.

Brackettville, Texas, 6th: A terrific hail storm struck this station at eight p. m., and was accompanied by high winds and vivid lightning:

St. Louis, Missouri, 5th: One of the severest hail-storms that has visited this city for many years, occurred between 4.37 and 4.58 p. m. The storm was preceded during the morning and early afternoon by a low barometer; the temperature rose rapidly and the atmosphere was sultry and oppressive. At about four p. m., dense masses of cumulo-stratus clouds appeared in the southwest and rapidly covered the sky. As their eastern edge neared the zenith, large round drops of rain began to fall, and vivid flashes of lightning were observed in the southwestern sky. A few minutes later, rain descended in sheets accompanied by loud peals of thunder. Rain continued to fall in torrents until hail began at 4.37 p. m., when it somewhat subsided. At the beginning, the hail-stones were about the size of peas, but they soon increased in size until they assumed the proportions of walnuts. From 4.37 to 4.50 p. m., hail-stones varying from the size of hazelnuts to walnuts showered down with terrific and destructive violence. From 4.30 to 4.45 p. m., the wind blew from the west at the rate of forty-two miles per hour, having suddenly increased to that velocity from twelve miles. From 4.51 to 4.58 p. m., the hail-stones were very large, but fell with less force than those that fell previous to that time. During the passage of the storm the barometer suddenly rose 0.10 inch, after which it fell to its former reading. Hail-stones as large as hen's eggs fell in various parts of the city; and in some instances were reported to have been as large as a "base-ball." The largest found on the roof of the building in which the office is located, weighed three-fourths of an ounce and measured five inches in circumference. The largest stones were quite soft and contained but little ice, while those of smaller size were very hard and contained but a small quantity of snow. After the passage of the storm the wind shifted to northwest, the temperature fell decidedly with a corresponding increase of pressure. The damage done by this storm has not been accurately determined, but is very great. During the storm many accidents occurred by the running away of teams, which were tortured by the falling hail-stones.

Hickman, Kentucky, 12th: At 2 p. m., a furious hail-storm set in, lasting about five minutes.

Shelbyville, Illinois, 5th: The severest hail storm that has occurred for many years visited this place between four and five p. m. The hail-stones were as large as walnuts, breaking many windows and doing great damage to gardens and farms.

Litchfield, Illinois, 5th: One of the heaviest rain and hail storms ever experienced in this vicinity occurred during the afternoon. The hail-stones were as large as hickory-nuts. The occurrence of hailstorms of less violence have been reported as follows: Newport, Rhode Island, 20th; Portland, Maine, 2d; Albany, New York, 12th; Lynchburg, Virginia, 6th; Fort Macon, North Carolina, 11th; Denison, Texas, 9th; Shreveport, Louisiana, 10th; Little Rock, Arkansas, 8th, 9th; San Antonio, Texas, 5th, 7th; Laredo, Texas, 6th; Rio Grande City, Texas, 15th; Knoxville, Tennessee, 12th, 15th, 16th; Logansport, Indiana, 4th; Sandusky, 27th; Toledo, Ohio, 6th; Marquette, Michigan, 24th; Duluth, Minnesota, 10th, 25th; Keokuk, Iowa, 5th; Des Moines, Iowa, 3d; Saint Paul, Minnesota, 8th; Springfield, Illinois, 27th; Huron, Dakota, 20th; Cheyenne, Wyoming, 15th; Rapid City, Dakota, 30th; Fort Keogh, Montana, 15th; Fort Custer, Montana, 19th; Fort Washakie, Wyoming, 25th; Fort Shaw, Montana, 4th, 18th; Fort Ellis, Montana, 15th, 18th; Helena, Montana, 16th, 27th, 29th; West Las Animas, Colorado, 5th, 26th; Grierson Springs, Texas, 17th; Stockton, Texas, 30th; Fort Elliott, Texas, 24th; Tucson, San Carlos, and Fort Grant, Arizona, 8th; Winnemucca, Nevada, 24th; Pioche, Nevada, 25th; Eagle Rock, Idaho, 28th; Umatilla, Oregon, 18th; Spokane Falls, Washington territory, 18th;

Portland, Oregon, 14th, 18th; Fort Bidwell, California, 2d; Fort Lyon, Colorado, 30th; Fort Garland, Colorado, 7th, 10th, 30th, 31st; Fort Randall, Dakota, 3d; Fort Sisseton, Dakota, 19th; Fort Snelling, Minnesota, 9th; Fort Union, New Mexico, 6th, 17th, 31st; Camp near Presidio, Texas, 2d; Fort Monroe, Virginia, 10th; Green Springs, Alabama, 11th, 18th; Auna, Illinois, 8th, 12th, 27th; Elmira, Illinois, 5th; Laconia, Indiana, 4th, 27th; Logansport, Saint Meinrad and Wabash, Indiana, 4th; Vevay, Indiana, 4th, 5th; Cresco and Nora Springs, Iowa, 4th; Muscatine, Iowa, 5th; Holton, Kansas, 25th; Clay Centre, Kansas, 26th; Wellington, Kansas, 27th; Cornish, Maine, 2d; Somerset, Massachusetts, 11th, 18th; Westborough, Massachusetts, 18th; Minneapolis, Minnesota, 8th; Protern, Missouri, 5th, 8th; De Soto, Nebraska, 26th; Genoa, Nebraska, 4th; New Market, New Hampshire, 2d, 18th; Freehold and South Orange, New Jersey, 6th; Flushing and Troy, New York, 28th; Murphy, North Carolina, 6th, 10th; Weldon, North Carolina, 10th; New Athens, Ohio, 27th; Albany, Oregon, 12th; Dybery, Pennsylvania, 18th; Meadville, Pennsylvania, 1st; Clarksville, Texas, 26th; Wytheville, Virginia, 5th; Manitowoc, Wisconsin, 8th; Missiou, Idaho, 12th.

SLEET.

Sleet was reported as follows: Boston, 8th; Fort Yates, Dakota, 20th; Dubuque, Iowa, 5th; Burlington, Iowa, 23rd; Cheyenne, Wyoming, 21st; North Platte, Nebraska, 22d; Fort Washakie, Wyoming, 9th; Pike's Peak, Colorado, 1st, 2nd, 5th, 6th, 25th; Santa Fé, New Mexico, 9th; Fort Garland, Colorado, 9th; Anna, Illinois, 12th; Huron, Dakota, 20th.

COTTON REGION REPORTS.

The following table gives the average rainfall, mean of the maximum and mean of the minimum temperatures, in each of cotton districts; as shown on the chart issued with the April REVIEW.

Meteorological Record for the Cotton Districts for the month of May, 1882.

DISTRICTS.	Average rainfall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans.....	5.57	84.4	61.1
Savannah.....	2.59	84.8	60.7
Charleston.....	2.53	81.9	58.1
Atlanta.....	2.39	78.9	56.2
Wilmington.....	2.52	79.0	54.6
Memphis.....	7.58	77.7	56.3
Galveston.....	5.25	83.9	59.9
Vicksburg.....	7.03	81.9	60.8
Montgomery.....	3.02	81.9	58.2
Augusta.....	2.11	82.2	57.8
Little Rock.....	11.04	78.7	53.6
Mobile.....	4.69	83.4	58.3

WINDS.

The prevailing direction of the winds during the month of May at Signal Service stations are shown on chart ii, by arrows flying with the wind. On the New England coast they were mostly from the south and southwest; in the middle Atlantic states from the northeast, south and southwest; in the south Atlantic states, from the south and southwest; in Florida, from the east; in the Gulf states, Rio Grande valley and southern slope, from the south and southeast; in Tennessee and the Ohio valley, mostly from the south; in the lower lake region, from the northeast and east, except at Oswego and Rochester, where they were westerly; in the upper lake region, mostly from the north; in southern California they were westerly; in the north and middle Pacific coast regions from the north and northwest; elsewhere they were variable.

TOTAL MOVEMENTS OF THE AIR.

The following are the largest total movements at Signal Service stations: Mount Washington, 27,241 miles; Pike's Peak, Colorado, 14,716; Delaware Breakwater, Delaware, 12,967; New Shoreham, Rhode Island, 12,382; Portsmouth, North Carolina, 12,313; Hatteras, North Carolina, 11,972; Indianola, Texas, 11,495; Kitty Hawk, North Carolina, 11,354; Dodge City, Kansas, 11,276; Thatcher's Island, Massachusetts, 10,870; Sandusky, 10,631; Cape Henry, Virginia,

10,298; Galveston, 10,216; Sandy Hook, New Jersey, 10,214; Milwaukee, 10,211; West Las Animas, Colorado, 9,983; Barnegat, New Jersey, 9,878; Macon, North Carolina, 9,783; Cape May, New Jersey, 9,771; Champaign, Illinois, 9,610; Fort Elliott, Texas, 9,411; North Platte, Nebraska, 9,393; Concho, Texas, 9,364; Atlantic City, New Jersey, 9,303; Fort Keogh, Montana, 9,211; Moorhead, Minnesota, 9,182; Stockton, Texas, 9,125; Huron, Dakota, 8,966; Boston, 8,955; Port Eads, Louisiana, 8,739; Bismark, Dakota, 8,707; Omaha, 8,495; Grand Haven, Michigan, 8,478; Cheyenne, Wyoming, 8,457; Madison, Wisconsin, 8,346; San Francisco, 8,300; Yankton, Dakota, 8,294; Coleman City, Texas, 8,230; Saint Paul, 8,221; Fort Bennett, Dakota, 8,194; Eagle Rock, Idaho, 8,088; Rochester, 8,043. The *smallest* are: La Mesilla, New Mexico, 2,502; Roseburg, Or., 2,540; Lynchburg, Virginia, 2,695; Silver City, New Mexico, 2,847; Visalia, California, 2,946; Missoula, Montana, 3,101; Vicksburg, 3,132; Tucson, Arizona, 3,133; Nashville, 3,362; Williamsport, Pennsylvania, 3,489.

HIGH WINDS.

The highest velocity reported during the month, (100 miles, nw.) occurred on the summit of Mount Washington, on the third. At that station velocities of fifty miles and over occurred each day during the month, except on the following dates: 3d, 4th, 16th, 19th and 22d.

Velocities exceeding seventy-five miles occurred as follows: 76, n w., 1st; 82, n w., 2d; 94, n w., 4th; 92, n w., 5th; 76, n., 9th; 84, n w., 21st; 76, w., 28th; 85, n w., 30th.

Other stations reporting velocities of fifty miles per hour or over, are as follows: Delaware Breakwater, Delaware, 58, e., 11th, and 54, ne., 12th; Fort Benton, Montana, 60, ne., 12th; Pike's Peak, Colorado, 55, sw., 19th; Dodge City, Kansas, 62, n w., 19th; West Las Animas, Colorado, 54, ne., 22d; Palestine, Texas, 60, s w., 5th; Indianola, Texas, 52, n., 31st; Galveston, 60, n w., 31st; Toledo, 52, e., 6th.

LOCAL STORMS.

Mount Ida, Arkansas, 8th: About 7.45 p. m. a violent tornado passed in a northeasterly course about two miles south of this place, destroying everything in its path. More than one hundred buildings were demolished; two persons were killed, and several injured; many horses, mules, cattle, and poultry were killed. The storm was accompanied by hail and rain.

Fort Wayne, Indiana, 27th: At 2 p. m. a tornado of tremendous force struck this county at the intersection of Madison, Monroe, Jackson and Jefferson townships, destroying several dwellings; barns and smaller buildings were also blown down and their timbers strewn for miles along the course of the storm. The width of the storm-track was not more than five rods, within which the destruction was very great.

Emmitsburg, Maryland, 28th: Severe storm, uprooting trees.

Clarksville, Texas, 30th: Severe storm occurred during the night, beating down fields of corn, wheat, and oats, and breaking large limbs from trees. The storm lasted thirty minutes.

Delaware Breakwater, 11th, 10.30 p. m.: The severest storm ever experienced at this season began and continued during the night. The signal office was filled with water from the sea washing over the breakwater. The American barkentine "John Boizly" dragged anchor and went ashore near Green Hill light, four miles west-southwest of station, and was strained badly.

New York: The storm of the eleventh and twelfth is considered to have been the most severe that has been experienced on this coast during the past twenty-nine years. The track of the New Jersey Southern railroad was washed away near Sandy Hook. The s. s. "Pliny," bound from Rio de Janeiro to New York, stranded near Long Branch, New Jersey, at three p. m. of the thirteenth.

Starkville, Mississippi, 10th: Storm during night; wind reaching a velocity of thirty-six miles. One building in course of construction was blown down.

Palestine, Texas, 5th: Severe storm, during which a wind velocity of sixty miles per hour was recorded. No serious damage was done at this place.

Logansport, Indiana, 4th: During a violent storm, several buildings at this place suffered injury. The post-office building had its plate-glass window blown out.

Cairo, Illinois, 8th: Heavy storm began at 8.05 and continued until 8.30 p. m. Four cars, occupied by fourteen section hands, on the track of the narrow-gauge railroad in the northern part of the city, were overturned and blown down an embankment. For five minutes the wind blew at the rate of forty-eight miles per hour.

Shreveport, 12th: Houses, forests, and plantations were wrecked in this region this morning by a tornado. One man and two children were killed, and many others dangerously wounded. Near Acadia many houses were destroyed and a large number of cattle killed. A new building was blown down upon a number of workmen, none of whom were killed.

Atchison, Kansas, 12th: A tornado at Cherokee City, a small watering place south of Marysville, killed two persons and wounded thirteen. Forty houses were demolished.

Petersburg, Virginia, 11th: A tornado visited the southeastern part of this state, blowing down several residences and barns and did considerable damage to crops.

Edwards, Mississippi, 12th: Severe storm visited this place last night; a number of residences were blown down or otherwise injured.

Louisville, 6th: During the storm last evening a steamer was blown from her moorings, a distance of about forty yards up the river when she swung around and struck a loaded coal-flat, which had to be unloaded to prevent it from sinking.

Keokuk, 6th: Reports from various points throughout the Des Moines valley and the vicinity of this city show that the storm of last night was unusually severe. Telegraph wires were prostrated and railroad travel delayed. The Chicago, Rock Island and Pacific railroad is under water three miles above Daniels. Several bridges were washed out on the Burlington and Southwestern and other railroad lines.

Hot Springs, Arkansas, 13th: Reports from Silver City, Arkansas, show that a violent tornado visited that place on the evening of the eighth. Stock, timber, fences and orchards were destroyed or injured. At Cado Cave, a residence was blown down and three occupants were thrown into a well. At Williams' Creek, buildings were wrecked and several persons injured. At McKinney's plantation about fifty buildings were destroyed. The damage done at this place will amount to \$30,000. At South Fork the postoffice was lifted and carried away and its contents destroyed. Hundreds of sheep, hogs, horses, and cattle were lost or killed, and \$5,000 in silver and currency were scattered to the winds and lost. One hundred families are rendered homeless and without shelter. The total damage incurred will not fall short of \$150,000. The storm appeared suddenly and was of short duration and moved in a southeasterly direction. At McAllister, a mining settlement in the Indian territory, on the night of the eighth, a most violent tornado occurred, almost destroying the entire place. Fifty-nine houses were totally demolished and twenty-seven damaged to a more or less extent. Twenty-one persons were killed and forty-two wounded. Settlements numbers five and seven of the Osage Mining Company were the ones visited, the latter receiving only the partial force of the storm. The fall of rain was very great and was accompanied by a large quantity of hail-stones, which fell as far north as Fort Gibson. A washout occurred on the Missouri, Kansas, and Texas railroad near Armstrong, causing suspension of travel. At Paris, Texas, the storm was also severe, and great damage was done to property.

Vandalia, Illinois, 5th: A heavy rain-storm accompanied by strong wind swept over this region at six p. m., causing considerable damage in this city and in the vicinity of the town of Crouch.

Warrenton, Missouri 9th: A tornado struck the Central Wes-

Ieyan College building about 12:15 a. m., completely wrecking it. There were seven persons sleeping in the building at the time who escaped unhurt. Parts of the roof were carried for a distance of a half a mile, and some of the timbers were driven into the ground to a depth of from two to three feet. The damage is estimated from ten to fifteen thousand dollars. At Mound City, Atchison county, the damage done was very great. Large trees were twisted off and others uprooted.

Jerseyville, Illinois 9th: Severe storm passed over this county, striking this city about one a. m. The heavy walls of a business house were blown down, together with a brick smoke-stack and numerous chimneys. Several out-buildings in vicinity were blown down. Near Newburn, forty miles of fence was destroyed, and in that section the storm was accompanied by hail, which did much damage to wheat.

Bunker Hill, Illinois, 9th: The storm of wind and rain of last night was most severe. Large numbers of shade and forest trees were uprooted.

Minneapolis, Minnesota, 9th: It is reported that a school-house five miles southwest of Lakefield was struck by a tornado yesterday. The building was lifted and scattered over the prairie. It was occupied by a teacher and eleven pupils, all of whom are more or less injured. The storm appeared in the form of a funnel-shaped cloud, which bounded along the prairie and passed into Herron lake, sucking up water to a height of one hundred feet.

Memphis, 10th: The severe storm, which swept over this section yesterday afternoon, did considerable damage. To the south and in the vicinity of Moor's Landing, trees and fences were blown down.

Fort Benton, Montana, 12th: Severe storm during night; wind attaining a velocity, for a few minutes, of seventy miles per hour. No serious damage resulted.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for May, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 89.5 per cent. The percentages for the four elements are: Weather, 92.9; Direction of the Wind, 88.8; Temperature, 88.2; Barometer, 87.9 per cent. By geographical districts they are: For New England, 84.8; middle Atlantic states, 87.8; south Atlantic states, 91.2; east Gulf states, 90.1; west Gulf states, 91.3; lower lake region, 90.6; upper lake region, 88.3; Tennessee and the Ohio valley, 90.7; upper Mississippi valley, 90.4; lower Missouri valley, 89.8; northern Pacific coast region, 77.1; middle Pacific coast region, 96.9; southern Pacific coast region, 87.5.

There were sixty-nine omissions to predict (twenty-one being due to the absence of reports from the Pacific coast) out of 3,813, or 1.8 per cent. Of the 3,744 predictions that have been made, 53, or 1.42 per cent., are considered to have entirely failed; 85, or 2.27 per cent., were one-fourth verified; 292, or 7.80 per cent., were one-half verified; 521, or 13.92 per cent., were three-fourths verified; 2,793, or 74.59 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

Ninety-one cautionary signals were displayed during the month of May, of which seventy three or 80.2 per cent were justified by winds of twenty-five miles per hour, at or within one hundred miles of the station. Thirteen "off-shore" signals were displayed, of which six, or 46.2 per cent., were fully justified; ten, or 76.9 per cent., were justified as to direction; and six, or 46.2 per cent., were justified as to velocity. One hundred and four signals of all kinds were displayed, of which seventy-nine, or 76 per cent., were justified. The above does not include signals ordered at sixty-nine display stations, where the velocity is estimated only.

Seventeen signals were reported late.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the table on the right hand of chart iii., are given the highest and lowest stages of water observed at Signal Service stations during the month of May, 1882. The Mississippi at Vicksburgh continued to fall, but remained above the danger line throughout the month. At New Orleans, the lowest point, [two inches below the danger-line] was reached on the twenty-ninth. At Memphis on the twenty-second, the water rose to within nine inches of the danger line; at Cairo on the twenty-second to thirty inches, and at Keokuk on the sixth, to twenty-two inches above the danger line. The highest water in the Ohio occurred from the thirteenth to the eighteenth. The Missouri was highest at Leavenworth on the twenty-second and thirty-first, and at Omaha on the twentieth.

FLOODS.

The excessive rainfall in the western Gulf states during the month has caused disastrous floods, entailing loss of life and much damage to property, especially in the state of Arkansas.

At Jacksonport, Arkansas, the overflow was the most destructive that has been visited that section for years. The town was completely submerged, and many persons were obliged to take refuge in the upper stories of storehouses.

The flood is said to have been the highest since 1876, the whole country for miles around being a sea of water. The damage to the wheat crop is very great.

At Batesville, Arkansas, May 12th, during a heavy rain-storm, which continued in torrents for twenty-four hours, the rivers and creeks rose to an unusual height. Mills, houses, bridges, and fences were washed away, and not only the crops, but in many cases, the soil is gone, leaving only a bare clay surface. The damage to property in the valley of the White river is generally estimated at more than \$500,000.

At Hot Springs, the damage to property amounted to \$30,000; all the bridges and foot-paths were destroyed, several buildings were washed to pieces, and the foundations of others were weakened. Stables, small outhouses, sheds, &c., were totally carried away. Railroad communication was entirely suspended owing to the damage sustained by the tracks and the destruction of bridges.

In Conway county, the destruction was very great, many acres of land being submerged and the crops destroyed; the total loss in this county is estimated at \$100,000.

At Little Rock, on the ninth, the streets were flooded, those leading in the direction of the river having the plank sidewalks washed away. The railroad tracks suffered injury and trains were delayed.

Reports from southern Illinois, dated May 5th, state that heavy and unprecedented rains have swollen all rivers and creeks, and caused considerable damage to movable property and growing crops in the bottom lands. The Saint Louis and Keokuk railroad is under water and railroad traffic is suspended. Serious washouts also occurred on the Chicago, Burlington and Quincy railroad, obstructing travel.

The observer at Cairo, reports that much damage has been done to the crops in that locality by the heavy rains and floods.

In southern Indiana, the counties of Jackson, Lawrence, and Martin were inundated and entire crops destroyed. Fifteen miles of track on the Bedford narrow-gauge railroad were washed away.

At Owingsville, Kentucky, May 12th, the heavy rains caused an overflow in Prickley-Ash creek, sweeping everything before it. All the fencing along the creek was swept away, and much stock was lost; wheat and corn planted in the bottoms suffered considerable damage.

Reports from Memphis, Tennessee, May 10th, stated that fears are entertained that another overflow may occur.

The Wolf river, to the east of Memphis, has overflowed and washed away several hundred yards of the levee at Raleigh,